

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions of the claims and all prior listings of the claims in the present application.

1. (previously presented) An apparatus for controlling a bit rate during reverse play of a digital video stream decoded by at least one group of pictures including subgroups of pictures having a plurality of pictures and a picture period, the apparatus comprising:

a sorting unit for receiving the at least one group of pictures and sorting intra-coded pictures, predictive-coded pictures, and bidirectionally predictive-coded pictures from the received at least one group of pictures;

a determining unit for determining a bit rate using size information from an intra-coded picture of a first subgroup of pictures in the at least one group of pictures received from the sorting unit, and for setting bit rates of next subgroups of pictures using the determined bit rate;

an intra-frame encoding unit for converting the predictive-coded pictures into intra-coded pictures for the reverse play using the set bit rates;

a storing unit for storing the intra-coded pictures received from the sorting unit, the converted intra-coded pictures received from the intra-frame encoding unit, and the bidirectionally predictive-coded pictures received from the sorting unit; and

a decoding unit for decoding and outputting the intra-coded pictures, the converted intra-coded pictures, and the bidirectionally predictive-coded pictures received from the storing unit.

2. (original) The apparatus of claim 1, wherein the determining unit sets the bit rates with respect to a state of the storing unit and the determined bit rate.

3. (original) The apparatus of claim 2, wherein the state of the storing unit is a remaining capacity of the storing unit.

4. (original) The apparatus of claim 1, wherein the determining unit is part of the intra-frame encoding unit.

5. (original) The apparatus of claim 2, wherein the determining unit is part of the intra-frame encoding unit.

6. (previously presented) The apparatus of claim 1, wherein the storing unit comprises:

a bidirectionally predictive-coded frame memory for storing the bidirectionally predictive-coded pictures received from the sorting unit; and

an intra-coded frame memory for storing the intra-coded pictures received from the sorting unit and the converted intra-coded pictures received from the intra-frame encoding unit.

7. (original) The apparatus of claim 1, further comprising a buffer linker containing pointing information for outputting the pictures stored in the storing unit to the decoding unit in a reverse play order.

8. (previously presented) A method of controlling bit rates of a plurality of pictures in a group of pictures while a video stream including at least one group of pictures is reverse played in a digital video play apparatus, the method comprising:

 sorting intra-coded pictures, predictive-coded pictures, and bidirectionally predictive-coded pictures from the group of pictures;

 determining size information from an intra-coded picture of a first subgroup of pictures in the group of pictures;

 determining a bit rate from the size information;

 setting bit rates required for converting the predictive-coded pictures of next subgroups of pictures contained in the group of pictures into intra-coded pictures, using the determined bit rate; and

 converting the predictive-coded pictures into intra-coded pictures using the set bit rates.

9. (previously presented) The method of claim 8, wherein setting bit rates is performed with respect to the size information and a state of a storing unit.

10. (previously presented) The method of claim 8, wherein the bit rates of the next subgroups of pictures are determined using the determined bit rate of an intra-coded picture of the first subgroup of pictures in each corresponding group of pictures.

11. (previously presented) The method of claim 8, further comprising:
storing the converted intra-coded pictures;
decoding the converted intra-coded pictures; and
outputting the decoded pictures in a reverse play order.

12. (previously presented) A method, comprising:
receiving a stream of digital video data including at least one group containing at least two different types of pictures;
determining at least one bit rate using size information from a picture of a first type of pictures contained in a first subgroup within the at least one group of pictures received;
setting the at least one bit rate for next subgroups of pictures; and

converting a second type of pictures into the first type of pictures for a reverse play operation using the set at least one bit rate.

13. (previously presented) An apparatus, comprising:

a sorting unit for receiving a stream of digital video data including at least one group containing at least two different types of pictures and for sorting the at least two different types of pictures from the at least one group of pictures received;

a determining unit for determining at least one bit rate using size information from a picture of a first type of pictures contained in a first subgroup within the at least one group of pictures received and for setting the at least one bit rate for next subgroups of pictures; and

an encoding unit for converting a second type of pictures into the first type of pictures for a reverse play operation using the set at least one bit rate.

14. (currently amended) An encoder, comprising:

a determining unit configured to receive a first picture type, wherein the first picture type is used in order to set a bit rate corresponding to size information of the first picture type; and

an encoding unit for converting a second picture type into the first picture type using the set bit rate.

15. (currently amended) A method for encoding, comprising:
receiving a first picture type used in order to set a bit rate corresponding to size information of the first picture type; and
converting a second picture type into the first picture type using the set bit rate.

16. (previously presented) An encoder for performing the method of claim 15, the encoder comprising:
a determining unit configured to receive the first picture type in order to set the bit rate corresponding to the size information of the first picture type;
and
an encoding unit configured to convert the second picture type into the first picture type using the set bit rate.

17. (previously presented) A video player apparatus, comprising:
a video player that receives a stream of digital video data including at least one group containing at least two different types of pictures from a digital video storage media, determines at least one bit rate using size information from a picture of a first type of pictures contained in a first subgroup within the at least one group of pictures received, sets the at least one bit rate for next subgroups of pictures, and converts a second type of pictures into the first type of pictures for a reverse play operation using the set at least one bit rate; and

a display unit that receives the first type of pictures and the converted pictures and provides a reverse image output according to a reverse display procedure.

18. (previously presented) A method, comprising:

receiving a stream of digital video data including at least one group containing at least two different types of pictures;

determining at least one bit rate using size information from a picture of a first type of pictures contained in a first subgroup within the at least one group of pictures received;

setting the at least one bit rate for next subgroups of pictures;

converting a second type of pictures into the first type of pictures for a reverse play operation using the set at least one bit rate; and

displaying the received first type of pictures and the converted pictures for a reverse image output according to a reverse display procedure.

19. (previously presented) A video player apparatus for performing the method of claim 18, the video player apparatus comprising:

a video player that receives the stream of digital video data including the at least one group containing the at least two different types of pictures from a digital video storage media, determines the at least one bit rate using the size information from the picture of the first type of pictures contained in the first

subgroup within the at least one group of pictures received, sets the at least one bit rate for the next subgroups of pictures, and converts the second type of pictures into the first type of pictures for the reverse play operation using the set at least one bit rate; and

a display unit that receives the first type of pictures and the converted pictures and provides the reverse image output according to the reverse display procedure.

20. (previously presented) An apparatus for controlling a bit rate during a reverse play of a digital video stream decoded by at least one group of pictures including subgroups of pictures having a plurality of pictures and a picture period, the apparatus performing the method of claim 8, the apparatus comprising:

a sorting unit for receiving the at least one group of pictures and sorting the intra-coded pictures, the predictive-coded pictures, and the bidirectionally predictive-coded pictures from the received at least one group of pictures;

a determining unit for determining the bit rate that uses the size information from the intra-coded picture of the first subgroup of pictures in the group of pictures received from the sorting unit, and for setting the bit rates of the next subgroups of pictures using the determined bit rate;

an intra-frame encoding unit for converting the predictive-coded pictures into intra-coded pictures for the reverse play using the set bit rates;

a storing unit for storing the intra-coded pictures received from the sorting unit, the converted intra-coded pictures received from the intra-frame encoding unit, and the bidirectionally predictive-coded pictures received from the sorting unit; and

a decoding unit for decoding and outputting the intra-coded pictures, the converted intra-coded pictures, and the bidirectionally predictive-coded pictures received from the storing unit.

21. (previously presented) An apparatus comprising the encoder of claim 14, the apparatus further comprising:

a sorting unit for receiving a stream of digital video data including at least one group of pictures containing at least two different types of pictures and for sorting the at least two different types of pictures from the at least one group of pictures received;

wherein the determining unit determines the bit rate using the size information of the first picture type contained in a first subgroup within the at least one group of pictures received and sets the bit rate for next subgroups of pictures.

22. (previously presented) A video player apparatus comprising the encoder of claim 14, the video display apparatus further comprising:

a sorting unit for receiving a stream of digital video data including at least one group of pictures containing at least two different types of pictures and for sorting the at least two different types of pictures from the at least one group of pictures received, wherein the determining unit determines the bit rate using the size information of the first picture type contained in a first subgroup within the at least one group of pictures received and sets the bit rate for next subgroups of pictures;

a video player that receives the stream of digital video data including the at least one group of pictures containing the at least two different types of pictures from a digital video storage media, determines the bit rate using the size information of the first picture type contained in the first subgroup within the at least one group of pictures received, sets the bit rate for the next subgroups of pictures, and converts the second type of pictures into the first type of pictures for reverse play operation using the set bit rate; and

a display unit that receives the first type of pictures and the converted pictures, and provides a reverse image output according to a reverse display procedure.